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PHENOLIC COMPOUNDS FROM *Potentilla alba*

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White cinquefoil (*Potentilla alba* L., Rosaceae) is a perennial plant of a genus that numbers 216 species around the world [1]. Phytotherapists recommend it for prevention or treatment of diseases of the thyroid gland, cardiovascular system, and gastrointestinal tract, in particular, ulcers. In addition, it is an antiseptic and wound-healing agent [2]. The plant contains iridoids, saponins, phenolcarboxylic acids, flavonoids, and tanning agents up to 6% in the aerial part and up to 17% in the subterranean part [3]. However, the chemical composition of white cinquefoil has not been systematically studied, which prompted further investigations.

The component composition of essential oils from the aerial and subterranean parts of *P. alba* and the contents of chlorophylls, flavonoids, and carotinoids were previously determined [4–6]. In continuation of those investigations, we studied phenolic compounds from the subterranean and aerial parts of *P. alba*. The herb collected before flowering and rhizomes with roots collected at the end of September in the Carpathians in 2009 were studied. Total acid hydrolysis of the EtOH extract of the aerial part of *P. alba* showed the presence of the flavonol aglycons quercetin and kaempferol in addition to the sugars glucose, rhamnose, and arabinose. Preparative TLC isolated five compounds, the structures of which were elucidated by chemical and physicochemical methods.

HPLC was used to determine the phenolic compounds. Portions (500 mg) of ground samples of air-dried raw material were weighed in 5-mL volumetric tubes. The volume was adjusted to the mark with MeOH (90%). The samples were irradiated for 30 min in an ultrasonic bath, left at room temperature for 3–4 h, placed for 15 min in the ultrasonic bath, and filtered through a teflon membrane filter (0.45 μm) into vials for analysis (Table 1). Phenolic compounds were identified by retention times of standards and spectral properties of the studied extracts. Chromatography was performed on an Agilent Technologies Model 1100 chromatograph equipped with a G1379A flow-vacuum degasser, a G13111A four-channel low-pressure gradient pump, a G1313A automated injector, a G13116A column thermostat, and a G1316A diode-matrix detector. The Zorbax-SB C-18 chromatographic column (2.1 × 150 mm) was packed with octadecylsilyl sorbent (3.5 μm). Phenolic compounds in MeOH extracts were identified by retention times of standard rutin, quercetin-3-*O*-glucoside, and *p*-coumaric acid (Sigma) and by comparison of spectral properties of the test compounds in the extracts with those of standards.

The aerial part contained quercetin-3-*O*-β-D-glucopyranosyl-*O*-β-D-rhamnopyranoside, quercetin-3-*O*-β-D-glucopyranosido-7-*O*-β-D-glucopyranoside, kaempferol-3-*O*-β-D-glucopyranoside, quercetin-3-*O*-α-L-arabinoside, and kaempferol-3-*O*-α-L-arabinoside. Total flavonoids from the aerial part were dominated by quercetin-3,7-*O*-diglucoside (1.03%). The subterranean part of *P. alba* afforded *p*-coumaric acid (0.11%). Quercetin-3,7-*O*-diglucoside, kaempferol-3-*O*-glucoside, quercetin-3-*O*-arabinoside, and kaempferol-3-*O*-arabinoside were not previously reported from *P. alba*.

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TABLE 1. Phenolic Compounds from *Potentilla alba*

Compound	Content, mg per 100 g	Retention time, min	Spectral characteristics, λ_{max}, nm
Aerial part			
Quercetin-3,7-*O*-diglucoside	1031.8	18.03	355, 265
Kaempferol-3-*O*-glucoside	70.0	19.56	351, 265
Quercetin-3-*O*-*β*-D-glucopyranoside-*O*-*β*-D-rhamnopyranoside	86.5	19.74	359, 259
Quercetin-3-*O*-arabinoside	10.9	20.79	357, 256
Kaempferol-3-*O*-arabinoside	23.3	21.26	350, 265
Subterranean part			
p-Coumaric acid	106.2	14.10	314, 230

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